Proceedings of the American Academy of Arts and Sciences.

Vol. XL. No. 24. — July, 1905.

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RECORDS OF MEETINGS.

Nine hundred and fiftieth Meeting.

JUNE 8, 1904.

The Academy met at the house of Edward Atkinson, Brookline.

The PRESIDENT in the chair.

On the motion of the Recording Secretary, it was

Voted, That the Committee appointed on June 17, 1903, consisting of the President, Treasurer, Librarian, and Recording Secretary, be reappointed to ascertain if more suitable accommodations for the Academy can be obtained.

Dr. Atkinson gave a communication on the following subjects: — I. "Peat, and its Manufacture," illustrated by an apparatus in operation. He exhibited in this connection various kinds of briquettes and of coke made from moss peat and from grass peat in this country and in Europe. He also showed the operation of generating illuminating gas from peat. II. "The Diffusion of Light shown by its Transmission through Various Types of Glass." III. "The Process of Cooking in the Aladdin Oven, with Specimens of Food cooked therein." IV. "Uralite." He called attention to specimens of Uralite, an artificial semi-flexible stone made by a combination of asbestos with silicate of soda, the silicate being subjected to what may be called a double reaction under heat and pressure which renders it insoluble. This material was invented in Russia, where its merits have been tested on a large scale, and is now used for the inside finish of important buildings in England,

and in India as a substitute for slate and thatch for roofing. It is incombustible, water-proof, neither shrinks nor contracts under heat or cold, weather-proof, and cheap. It may be worked with ordinary carpenters' tools, planed, polished, veneered, painted, frescoed, or otherwise treated.

The following papers were presented by title by Professor John Trowbridge: —

"Resonance in Wireless Telegraphy," by G. W. Pierce.

"A Manometric Device for the Air Thermometer," by Harold Edwards.

"Note on the Platinum Thermometer," by Harold Edwards.

"Spectra of Gases at High Temperatures," by John Trowbridge.

Nine hundred and fifty-first Meeting.

October 12, 1904. — Stated Meeting.

The President in the chair.

The following letters were read: —

From Herbert Weir Smyth, accepting Resident Fellowship; from Eugene W. Hilgard, James D. Hague, T. Mitchell Prudden, acknowledging election as Associate Fellows; from Adolf Harnach, Gaston Boissier, Pasquale Villari, Felix Klein, accepting Foreign Honorary Membership; from the Prussian Minister, Mr. Studt, presenting a medal commemorating the bi-centennial jubilee of the Royal Prussian Academy of Sciences; from the National Society of Natural Sciences and Mathematics of Cherbourg, announcing the death of its director and founder, M. Auguste-François Le Jolis; from the Belgian Society of Astronomy, soliciting membership; from the National Library of Turin, soliciting aid in replacing its library lost by fire; from a committee soliciting contributions for erecting a monument to Theodor Mommsen.

The Chair announced the following deaths: —

James M. Barnard, Resident Fellow in Class I., Section 3; George F. Hoar, Resident Fellow in Class III., Section I.

On motion of the Recording Secretary, it was

Voted, To meet on adjournment on the second Wednesday in November.

The following communication was given by Professor Charles R. Cross: —

"Description of a Mechanical Model devised by Professor Schwamb to illustrate the Theory of Rotary Polarization of Light."

The following papers were presented by title: —

"A Quantitative Determination of the Anomalous Dispersion of Sodium Vapor in the Visible and Ultra-Violet Regions." By R. W. Wood.

"A Revision of the Atomic Weight of Iodine." By G. P. Baxter.

"Some Additions to the Arc Spectra of the Alkali Metals." By F. A. Saunders.

"The Effect of Heat on the Color Changes in the Skin of Anolis carolinensis Cuv." By G. H. Parker and S. A. Starratt.

"The Achromatization of Approximately Monochromatic Interference Fringes by a highly Dispersive Medium, and the Consequent Increase in the Allowable Path-Difference." By R. W. Wood.

Nine hundred and fifty-second Meeting.

NOVEMBER 9, 1904. — ADJOURNED STATED MEETING.

The Academy met at the house of the President in Cambridge.

The PRESIDENT in the chair.

The following death was announced by the Chair: —

Dr. Samuel Leonard Abbot, Resident Fellow in Class II., Section 4, Recording Secretary of the Academy from 1854 to 1863.

The following letter was read by the Recording Secretary: —

10 June, 1904.

MY DEAR PROFESSOR WATSON, —

In accordance with a vote passed at the meeting of the Academy held on the 8th instant, I have bought, in the name of the American Academy

of Arts and Sciences and for the sum of $30,000, the estate No. 28 Newbury Street, Boston, subject to the condition that an examination of the title thereto shall show that there are no restrictions which may prevent said Academy from building a stack-room on the land which lies between the rear of the present house and the alley.

The title to this property will be conveyed in about three weeks.

As I construe the Constitution of the Academy, I do not think that any formal proceedings with reference to this purchase can be taken until the stated meeting in October.

Very truly yours,

FRANCIS BLAKE.

On motion of the Recording Secretary, it was

Voted, That the Academy ratify the action of the Finance Committee in purchasing for thirty thousand dollars ($30,000) the property No. 28 Newbury St.

The Committee on Accommodations for the Academy appointed in June made the following report : —

REPORT OF THE COMMITTEE ON ACCOMMODATIONS FOR THE ACADEMY.

Since the Committee on providing quarters for the Academy was appointed on the 8th of June last, the Treasurer has purchased in the name of the Academy the estate numbered 28 Newbury Street. This comprises a dwelling house on the south side of the street, measuring 25 feet by 56 feet, with an open yard in the rear measuring 25 feet by 34 feet.

This house was built about the year 1870 and is in very good repair. It comprises four stories of good height, besides a basement, in which are the kitchen, furnace, etc.

The Committee now beg to report that they find that very slight changes in the building itself will be needed in order to adapt it to the uses of the Academy, but that for the accommodation of the library, it is desirable to erect a book-stack in the rear, occupying a part of the yard. This will not injure the light in the building.

The Committee have consulted Messrs. Fehmer & Page, the architects of the building, and are informed by them that such a book-stack as is needed will cost about $15,000. It will be fire-proof, composing six stories, each about 7 feet high, with ample staircases, and passageways,

and would be convenient of access to the principal stories of the house. It will be exceptionally well lighted, the eastern side being almost entirely of glass. There will be accommodation for about 50,000 volumes and there will be room besides for 5,000 or 10,000 more in book-shelves distributed through the main building.

The two lower stories of the house, containing four large rooms, would be ample for the Office and Reading Rooms, and for the meetings of the Academy. The two upper stories afford ample accommodation for the Assistant Librarian, besides a certain amount of storeroom.

By the expenditure of $2,000 or $3,000 in addition, a larger meeting-room for the Academy, measuring about 25 feet by 30 feet, could be provided in the second story, if at any time it should be deemed desirable.

W. W. Goodwin.
Wm. Watson.
A. Lawrence Rotch.

On motion of Professor W. E. Story, it was

Voted, To accept the report.

After some discussion relating to the library, on the motion of Professor A. G. Webster, it was

Voted, That a committee of five be appointed to consider the whole subject of library accommodations and to report at the next meeting.

The following Committee was then appointed by the President: Francis Blake, William R. Ware, A. Lawrence Rotch, Eliot C. Clarke, Charles P. Bowditch.

On the motion of the Recording Secretary, it was

Voted, To meet on adjournment December 14, 1904.

The following communication was given by Professor M. H. Morgan: —

"The Stature of the Ancient Romans."

Nine hundred and fifty-third Meeting.

Adjourned Stated Meeting. — December 14, 1904.

The President in the chair.

The Chair announced the following deaths: —

Louis Palma di Cesnola, Associate Fellow in Class III., Section 4; Thomas Messinger Drown, Associate Fellow in Class I., Section 3.

The Recording Secretary read the following letter from the Recording Secretary of the Massachusetts Historical Society: —

WALTHAM, Dec. 12, 1904.

DEAR MR. WATSON, —

At the last meeting of the Mass. Historical Society it was *Voted* —

"To allow the American Academy of Arts and Sciences to use the rooms in our building, which they at present occupy, *without charge* till their removal."

Yours truly,

EDWARD J. YOUNG, *Recording Secretary.*

On motion of C. P. Bowditch it was

Voted, That the thanks of the Academy be tendered to the Massachusetts Historical Society in grateful acknowledgment of the favor to the Academy, in allowing the use of the rooms it now occupies, free of charge, until removal.

The following report of the Committee on House and Library Accommodations at 28 Newbury Street was read: —

The Committee appointed on the 9th of November to examine and report upon the house No. 28 Newbury Street, recently bought by the Academy, have visited the house, and consulted with the architects who built it in regard to the nature and cost of the necessary alterations and constructions. They find that even if the building could be made fire-proof, which it cannot, the floors are not strong enough to sustain the weight of the library; but that a fire-proof book-stack can be built in the rear of the house without injuriously darkening it. They find also that the two lower stories are excellently adapted for the uses of the Academy. These afford on the lower floor a room, in front, for the Secretary, and in the rear a reading-room, lighted by south windows and in immediate connection with the book-stack, in which might be placed the most recent additions to the library and current numbers of periodicals. In the second story is a room, handsomely finished in oak, which would serve as a council chamber, and here might be placed, perhaps, encyclopaedias and other works of reference. Behind it,

towards the south, is a room for meetings, which by the removal of some closets can be made 30 feet long. The book-stacks would contain the library of the Academy, although a considerable number of books, such as, if destroyed, could easily be replaced, can properly be put upon shelves in the reading-rooms and meeting-room.

The Academy cannot itself use the two upper stories, and these can be occupied by a janitor, or care-taker, or leased, as may prove most advisable.

The cost of the book-stack will be about $15,800; that of altering and furnishing the two lower stories will be about $3,000. To this should be added $2,500 for the cost of moving, architects' fees, and other incidental expenses, making altogether about $21,300.

We accordingly recommend that the Treasurer be authorized to expend for these purposes a sum not exceeding $25,000, under the direction of the President, acting with the advice and consent of the Recording Secretary and Librarian, as soon as the resources of the Academy permit; and that if it is necessary to defer the building of the *book-stack*, the library be meanwhile properly stored, but that the house itself be fitted for occupation as soon as possible. Also that he be authorized to fit up and lease the two upper stories, if it prove best to do so.

The suggestion that the books of the Academy should be deposited with the Boston Public Library, or stored elsewhere, does not commend itself to the judgment of the Committee.

WILLIAM R. WARE,
Chairman for the Committee.

December 9, 1904.

It was then

Voted, That the foregoing report of the Committee be accepted, placed on file, and that the Committee be discharged.

After a lengthy discussion participated in by Messrs. Bowditch, Clarke, Davis, Denny, Goodwin, Hall, Lanman, Mark, Sabine, Sharples, Watson, and Webster, it was

Voted (by a majority of twenty-three to two), That the Treasurer and Committee of Finance be authorized to expend a sum not exceeding twenty-five thousand dollars ($25,000) under the direction of the President, acting with the advice and consent of the Recording Secretary and Librarian, for the pur-

pose of building a book-stack on the estate No. 28 Newbury Street, and of putting the premises in a suitable condition for occupancy by the Academy, and by others.

It was also

Voted, That the Treasurer and Committee of Finance be authorized to lease the first, third, and fourth floors of the building No. 28 Newbury Street, and such portions of the basement as may not be needed for the use of the Academy.

The following paper was read by Professor W. H. Pickering: "Section of a Crater formed naturally in Slag (with Model)."

The following papers were read by title: —

"A Machine for Averaging Curves for the Purpose of Harmonic Analysis." By H. H. Clayton.

"The Shoal-Water Deposits of the Bermuda Banks." By Henry B. Bigelow. Presented by E. L. Mark.

"Gas Turbine Cycles on the $P\,Q$ Plane." By Harvey N. Davis. Presented by John Trowbridge.

"The Viscosity of Air." By J. L. Hogg. Presented by John Trowbridge.

"On a Measurement of the Thomson Thermo-Electric Effect in Soft Iron." By Edwin H. Hall.

Nine hundred and fifty-fourth Meeting.

STATED MEETING. — JANUARY 11, 1905.

The Academy met, by invitation of Professor D. G. Lyon, at the Semitic Museum, Cambridge.

The PRESIDENT in the chair.

On motion of C. R. Cross, it was

Voted, That a sum not exceeding two hundred and fifty dollars ($250) be appropriated from the income of the Rumford Fund, subject to the order of the Rumford Committee, for the preparation and distribution of a pamphlet relating to the Rumford Fund and its uses.

A communication, illustrated by lantern projections, on the Semitic Museum, was given by Professor D. G. Lyon.

The following papers were read by title: —

"On Isothermal Systems of Conics with Parallel Axes." By B. O. Peirce.

"On the Magnetic Properties of Hardened Cast Iron." By B. O. Peirce.

"The Atomic Weight of Strontium." By Theodore W. Richards.

Nine hundred and fifty-fifth Meeting.

FEBRUARY 8, 1905.

The Academy met at Ellis Hall.

The PRESIDENT in the chair.

The Corresponding Secretary read the announcement of the opening of the competition for the De Candolle Prize, for the best monograph on a genus, or a family of plants.

The following communications were read: —

Biographical Notice of the late George Frisbie Hoar. By T. W. Higginson.

"Swan Island in the Caribbean Sea, with a List of Plants found upon it." By S. P. Sharples.

"A Machine for Averaging Curves for the Purpose of Harmonic Analysis." By H. H. Clayton.

The following papers were presented by title: —

"Temporal Clauses in Herodotus." By H. D. Brackett. Presented by H. W. Smyth.

Contributions from the Gray Herbarium of Harvard University, New Series, No. XXIX. "New Plants from the Islands of Margarita and Coche, Venezuela." By J. R. Johnston. Presented by B. L. Robinson.

Nine hundred and fifty-sixth Meeting.

STATED MEETING. — MARCH 8, 1905.

The PRESIDENT in the chair.

The Corresponding Secretary read letters from John R. Freeman, "On the Subsidence of the Land in Boston Harbor and

Vicinity," accompanied by a pamphlet and newspaper clippings suggesting the appointment of a committee to investigate the subject; from the Royal Academy of Turin, containing the program of the fifteenth Bressa prize; from the Macon Academy, announcing a competition for prizes, on the occasion of its one hundredth anniversary; from Mme. Cornu, transmitting the collected works of her husband, M. Alfred Cornu.

The Chair announced the following deaths: —

George Sewall Boutwell, Resident Fellow in Class III., Section 4; Alpheus Spring Packard, Associate Fellow in Class II., Section 3.

The Chair appointed the following retiring Councillors to act as Nominating Committee: —

Arthur G. Webster, of Class I.

Edward L. Mark, of Class II.

Arlo Bates, of Class III.

Mr. Eliot C. Clarke proposed that Chapter VII. of the Statutes be amended by adding to it the following clause: —

5. The Treasurer may appoint an Assistant Treasurer to perform his duties, for whose acts as such Assistant, the Treasurer shall be responsible; or the Treasurer may employ any Trust Company, doing business in Boston, Massachusetts, as agent to perform his duties, the compensation of such agent to be paid from the funds of the Academy.

In accordance with the Statutes, this proposed amendment was referred to a Committee of one, — Professor Charles R. Cross.

On the recommendation of the Rumford Committee, it was

Voted, To appropriate the sum of five hundred dollars ($500) from the income of the Rumford Fund to Harry W. Morse in aid of his researches on Fluorescence.

The following papers were read: —

"On Light of very Short Wave-Length." By Theodore Lyman.

"On the First Observations obtained with Registration Balloons in America." By A. Lawrence Rotch.

The following papers were read by title: —

"The Extension to Hyper Complex Number Systems in general of the Quarternion Scalar Function." By Henry Taber.

"Dispersion in Electric Double Refraction." By Howard L. Blackwell. Presented by John Trowbridge.

"New Methods of Determining the Specific Heat and the Reaction-Heat of Solutions." By T. W. Richards and A. B. Lamb.

"The Elimination of Thermometric Lag and Accidental Loss of Heat in Calorimetry." By T. W. Richards, G. S. Forbes, and L. J. Henderson.

"The Coefficient of Expansion of Hydrogen and Carbon Dioxide under Constant Pressure." By T. W. Richards and K. L. Mark.

"Autocatalytic Decomposition of Silver Oxide." By G. N. Lewis. Presented by T. W. Richards.

Nine hundred and fifty-seventh Meeting.

APRIL 8, 1905.

The Academy met in Ellis Hall.

The PRESIDENT in the chair.

The Corresponding Secretary read the following letters: From the Société de Géographie Commerciale de Bordeaux, giving the conditions of the competition for the Saint-Laurent prizes; from the Académie des Sciences, Agriculture, Arts et Belles Lettres d'Aix, relative to the Thiers prize; from the Royal Hungarian Society, inviting the botanists attending the Botanical Congress to be held at Vienna, in June, 1905, to make an excursion in the territory of Hungary; from Arnold Samuelson, of Hamburg, on the subject of the "Resistance of the Air and the Question of Flying"; from the Natural Science Society of Schleswig-Holstein, inviting delegates to take part in the celebration of its fiftieth anniversary, June 17 and 18, 1905; from C. H. Wind, announcing his appointment as Director-in-Chief of the Institut Météorologique royal des Pays-Bas.

The following communications were given: —

Professor William M. Davis. "The Double Unconformity in the Colorado Canyon."

Mr. Hiram F. Mills. Biographical Notice of the late Charles Storer Storrow."

The following papers were read by title: —

"The Relative Positions of the Arc and Spark Lines of the Spectra of Titanium and Zinc." By Norton A. Kent. Presented by Charles R. Cross.

Contributions from the Gray Herbarium of Harvard University. New Series — No. XXX. "A Revision of the Genus Zexmenia." By W. W. Jones. Presented by B. L. Robinson.

Contributions from the Gray Herbarium of Harvard University. New Series — No. XXXI. I. "Descriptions of Spermatophytes from the Southwestern United States, Mexico, and Central America." By J. M. Greenman. II. "Diagnoses and Notes relating to American Eupatorieae." By B. L. Robinson. Presented by B. L. Robinson.

Nine hundred and fifty-eighth Meeting.

Annual Meeting — May 10, 1905.

The Academy met in Ellis Hall.

The President in the chair.

The Corresponding Secretary read the following letters: From William F. Ganong, resigning Fellowship; from Professor Curtius and others, soliciting contributions for a monument to Robert Bunsen, at Heidelberg; from the American Chemical Society, transmitting the program of its thirty-second general meeting.

The Chair announced the death of James C. Carter, Associate Fellow in Class III., Section 1.

The annual report of the Council was read.*

The annual report of the Treasurer was read, of which the following is an abstract: —

* See p. 761.

General Fund.

Receipts.

Balance from last year		$405.09
Investments	$6,045.93	
Assessments	970.00	
Admission fees	20.00	
Sale of publications	75.06	7,110.99
		$7,516.08

Expenditures.

General expenses	$2,622.79
Publication expenses	2,790.89
Library expenses	1,517.01
Balance	585.39
	$7,516.08

Rumford Fund.

Receipts.

Balance from last year		$557.68
Investments	$2,546.98	
Sale of publications	3.75	2,550.73
		$3,108.41

Expenditures.

Researches		$1,650.00	
Medals		339.00	
Publications		697.92	
Special pamphlet		12.00	
Miscellaneous		20.00	
Library. — Subscriptions	$131.10		
Books	50.74		
Binding	16.45	198.29	2,917.21
Balance			191.20
			$3,108.41

Warren Fund.

Receipts.

Balance from last year	$492.05
Investments	330.08
	$822.13

Expenditures.

Researches	$155.00
Balance	667.13
	$822.13

Building Fund.

Receipts.

Balance from last year	$389.90
Investments	142.33
Balance	$532.23

The following reports were also presented: —

Report of the Librarian.

1904–5.

Nothing has been done during the year on the card-catalogue which was begun by Dr. Holden; the present Assistant Librarian having devoted much time and personal interest to making shelf-lists of the books, and to preparing the library for removal with the least disturbance to the present arrangement of the books. When the library is installed at 28 Newbury Street, the catalogue will be continued.

More binding than usual has been done this year in order to put the books into as good condition as possible for removal. The library was never in better condition in this respect.

Many missing parts of volumes or sets have been obtained, and others will be sent for during the ensuing year, thereby making the sets of publications of societies as complete as possible.

The accessions during the year have been as follows: —

	Vols.	Parts of Vols.	Pams.	Maps.	Total.
By gift and exchange . . .	188	1884	200	4	2276
By purchase — General Fund	4	717			721
Rumford Fund	20	370	1		391
Total	212	2961	201	4	3388

17 volumes and 1 pamphlet on light and heat, recommended by the Rumford Committee, were purchased at an expense of $50.74.

92 books have been borrowed from the library by 27 persons, including 9 Fellows. The library has been consulted about seventy-five times when no book was taken out.

Of the books borrowed, all have been returned for the annual examination except 8. Of the 11 volumes reported not returned a year ago, one was lost and has been replaced; another lost will be replaced shortly; all others have been returned.

The expenses charged, to the library are as follows: — Miscellaneous, $499.97; Binding. $526.95, General, and $16.45, Rumford Funds; Subscriptions, $490.09, General, and $120.60, Rumford Funds; making a total of $1517.01 for the General, and $147.05 for the Rumford Funds.

Although the appropriation from the General Fund for books and binding was exceeded by $117.01, the appropriation of $100 for cataloguing was not expended, making the net excess but $17.01.

The expense of distributing the Proceedings amounted the past year to $216.40.

The printing bill (not including the Manila envelopes for the Proceedings) was $107.50.

An appropriation of $1500 from the income of the General Fund is requested, $900 of which is to be used for subscriptions and binding, and $600 for miscellaneous expenses. Also the customary appropriation of $150 from the income of the Rumford Fund is requested for the purchase of periodicals and for binding.

A. Lawrence Rotch, *Librarian.*

Report of the Rumford Committee.

The Chairman of the Rumford Committee respectfully presents the following report upon its work of the last year: —

The following grants have been made by the Committee out of the appropriation of $1000 put at its disposal at the last annual meeting.

Oct. 12, 1904. Three hundred and fifty dollars ($350) to Professor

R. W. Wood in aid of his research on the optical and other physical properties of sodium vapor.

Oct. 12, 1904. One hundred dollars ($100) to Professor N. A. Kent as an addition to a former appropriation in aid of his research on the critical conditions influencing electric spark lines.

Oct. 12, 1904. One hundred and fifty dollars ($150) to Professor A. L. Clark as an addition to a former appropriation in aid of his research on the molecular properties of vapors in the neighborhood of the critical point.

Jan. 11, 1905. Two hundred dollars ($200) to Professor D. B. Brace as an addition of a former appropriation in aid of his research on electric double refraction in gases.

Feb. 8, 1905. One hundred and fifty dollars ($150) to Professor C. B. Thwing in aid of his research on the thermo-electromotive force of metals and alloys.

Feb. 8, 1905, it was voted to request the Academy to appropriate five hundred dollars ($500) from the income of the Rumford Fund to Dr. H. W. Morse of Harvard University in aid of his research on fluorescence. The appropriation was granted by the Academy.

It was voted at the meeting of April 12, 1905, to request the Academy to appropriate from the income of the Rumford Fund the sum of two hundred dollars ($200) to Professor J. Trowbridge, Rumford Professor of the Application of Science to the Useful Arts in Harvard University in aid of a research on the electric double refraction of light.

At the same meeting it was voted to request the Academy to appropriate from the income of the Rumford Fund the sum of two hundred dollars ($200) to Professor E. H. Hall of Harvard University in aid of his research on the thermal and thermo-electric properties of iron and other substances.

In considering possible ways of increasing the usefulness of the Rumford Fund the Committee came to believe that it was desirable to publish a pamphlet regarding its character and the scientific results attained by its aid which could be distributed among scientific men. At the request of the Committee, the Academy has made an appropriation for the purpose from the income of the Fund, and the publication is now in press.

At the meeting of April 12, 1905, the Committee voted: —

(1) To request the Academy to appropriate the sum of $1000 from the income of the Rumford Fund for the immediate needs of the Committee in furtherance of research.

(2) To request the Academy to appropriate from the income of the

Rumford Fund the sum of $150 for the purchase and binding of the usual periodicals.

(3) To recommend to the Academy to appropriate from the income of the Rumford Fund the sum of $50 for the purchase and binding of books relating to light and heat, and to reappropriate the unexpended balance of the appropriation made at the last annual meeting for the same purpose.

(4) To continue the appropriation of $250 made from the income of the Rumford Fund for the preparation and distribution of a pamphlet relating to that Fund.

In accordance with the customary request of the Committee, reports on the progress of their researches have been received from the following persons: C. Barus, F. L. Bishop, D. B. Brace, A. L. Clark, E. B. Frost, G. E. Hale, G. F. Hull, W. J. Humphreys, N. A. Kent, F. A. Laws, R. S. Minor, E. W. Morley, E. C. Pickering, T. W. Richards, R. W. Wood.

Since the last annual meeting papers have been published as follows at the expense of the Rumford Fund: —

R. W. Wood. "A Quantitative Determination of the Anomalous Dispersion of Sodium Vapor in the Visible and Ultra-Violet Regions."

F. A. Saunders. "Some Additions to the Arc Spectra of the Alkali Metals."

R. W. Wood. "The Achromatization of Approximately Monochromatic Interference Fringes by a Highly Dispersive Medium, and the Consequent Increase in the Allowable Path-Difference."

H. N. Davis. "A *PQ* Plane for Thermodynamic Cyclic Analysis."

T. W. Richards and A. B. Lamb. "New Methods of Determining the Specific Heat and the Reaction-Heat of Liquids."

G. N. Lewis. "Autocatalytic Decomposition of Silver Oxide."

The Committee has considered the claims of various persons as suitable candidates to receive the Rumford Premium, but is not prepared to recommend an award.

CHAS. R. CROSS, *Chairman.*

REPORT OF THE C. M. WARREN COMMITTEE.

The C. M. Warren Committee beg leave to report that on account of the small amount of money at their disposal during the past year, they deemed it wise not to make any grants during the year for research work in chemistry. The amount of money now at the disposal of the Committee for the current fiscal year is, according to the account of

the Treasurer, six hundred sixty-seven and $\frac{13}{100}$ dollars ($667.13); and the Committee ask that six hundred dollars of this sum be placed at their disposal for use in the furtherance of chemical research.

LEONARD P. KINNICUTT, *Chairman.*

REPORT OF THE COMMITTEE OF PUBLICATION.

During the year beginning May 1, 1904, and ending April 30, 1905, there were published four numbers (21 to 24 inclusive) of the Proceedings, Volume XXXIX., and the first twenty-two numbers of Volume XL., in all 885 pages, 7 plates, and 7 maps and charts. Two biographical notices were published. Six numbers of the Proceedings (Volume XXXIX., No. 21; Volume XL., Nos. 6, 9, 16, 19, and 20) were paid for by income from the Rumford Fund.

Of the Memoirs, Volume XIII., Part II, 58 pages, and 2 plates, was issued in November, 1904. By an oversight the publication of Volume XIII., Part I, January, 1904, was not announced in the last annual report.

The unexpended balance of appropriations from the General Fund for publications on April 30, 1904, was $594.38; the appropriation for the year 1904–1905, $2,400; and the receipts from sales of publications, $75.06, making the whole amount available for publications, $3,069.44. The total expenditures for publication during the year now ended have been, from the Rumford Fund $697.92, from the General Fund $2,790.89. The unexpended balance from the General Fund is therefore $278.55.

E. L. MARK, *Chairman.*

May 10, 1905.

On the recommendation of the Committee of Finance, it was

Voted, To make the following appropriation from the income of the General Fund for expenditures during the ensuing year: —

For Publishing		$2,400
For the Library		
Books and Binding	$900	
Miscellaneous	600	1,500
		$3,900

On the recommendation of the Rumford Committee, it was

Voted, To make the following appropriations from the income of the Rumford Fund: —

For the immediate needs of the Committee in furtherance of research, $1,000.

For the purchase and binding of the usual periodicals, $150.

For the purchase and binding of books relating to light and heat, $50.

For the same purpose, the unexpended balance of the appropriation made at the last annual meeting

For the preparation and distribution of a pamphlet relating to that Fund, the continuance of the appropriation of $250.

To Professor John Trowbridge, in aid of a research on the electric double refraction of light, $200.

To Professor E. H. Hall, in aid of his research on the thermal and thermo-electric properties of iron and other substances, $200.

On the recommendation of the C. M. Warren Committee it was

Voted, To make the following appropriation from the income of the C. M. Warren Fund: —

For the use of the C. M. Warren Committee in furtherance of chemical research, $600.

On the motion of the Recording Secretary, it was

Voted, That the annual assessment for the ensuing year be ten dollars ($10).

The report of the Committee to whom the amendment of the Statutes was referred at the meeting of March 8, 1905, was accepted, and in accordance therewith, and on the motion of the Recording Secretary, it was

Voted, That Chapter VII. of the Statutes be amended by adding to it the following clause:

5. The Treasurer may appoint an Assistant Treasurer to perform his duties, for whose acts as such Assistant, the Treasurer shall be responsible; or the Treasurer may employ any Trust Company, doing business in Boston, Massachusetts, as agent to perform his duties; the compensation of such Assistant Treasurer or agent to be paid from the funds of the Academy.

The annual election resulted in the choice of the following officers and committees: —

WILLIAM W. GOODWIN, *President.*
JOHN TROWBRIDGE, *Vice-President for Class I.*
HENRY P. WALCOTT, *Vice-President for Class II.*
JOHN C. GRAY, *Vice-President for Class III.*
EDWIN H. HALL, *Corresponding Secretary.*
WILLIAM WATSON, *Recording Secretary.*
CHARLES P. BOWDITCH, *Treasurer.*
A. LAWRENCE ROTCH, *Librarian.*

Councillors for Three Years.

WALLACE C. SABINE, of Class I.
WILLIAM G. FARLOW, of Class II.
EDWARD ROBINSON, of Class III.

Member of Committee of Finance.

ELIOT C. CLARKE.

Rumford Committee.

CHARLES R. CROSS, ERASMUS D. LEAVITT,
EDWARD C. PICKERING, AMOS E. DOLBEAR,
ARTHUR G. WEBSTER, THEODORE W. RICHARDS,
ELIHU THOMSON.

C. M. Warren Committee.

LEONARD P. KINNICUTT, ROBERT H. RICHARDS,
SAMUEL CABOT, ARTHUR M. COMEY,
ARTHUR MICHAEL, HENRY P. TALBOT.
CHARLES R. SANGER.

The following standing committees were appointed by the Chair: —

Committee of Publication.

SETH C. CHANDLER, of Class I., EDWARD L. MARK, of Class II.,
CRAWFORD H. TOY, of Class III.

Committee on the Library.

HARRY M. GOODWIN, of Class I., SAMUEL HENSHAW, of Class II., HENRY W. HAYNES, of Class III.

Auditing Committee.

HENRY G. DENNY, FREDERICK J. STIMSON.

On the motion of the Recording Secretary, the following resolution was unanimously adopted: —

Resolved, That the Fellows of the American Academy desire to place upon record their grateful appreciation of the services of the retiring Treasurer, Francis Blake, during the six years in which he has served them.

On the motion of the Chairman of the Finance Committee it was

Voted, To authorize the expenditure of fifteen hundred dollars ($1500), in addition to the twenty-five thousand dollars ($25,000), which was authorized by the Academy at the meeting of December 14, 1904, to be expended for the purpose of building a book-stack on the estate No. 28 Newbury Street, and of putting the premises in a suitable condition for occupancy by the Academy, and by others.

The following gentlemen were elected members of the Academy: —

Samuel Williston, of Belmont, to be a Resident Fellow in Class III., Section 1 (Philosophy and Jurisprudence). Nominated by James Barr Ames, Jeremiah Smith.

Charles E. Munroe, of Washington, D. C., to be an Associate Fellow in Class I., Section 3 (Chemistry), in place of the late Thomas M. Drown.

The following communication was given, by Professor T. A. Jaggar: — "Some Results of the Study of the Volcano Pelée."

The following papers were presented by title: —

"On the Effects of Sudden Changes in the Inductances and the Resistances of Electrical Circuits." By B. O. Peirce.

WILLIAM W. GOODWIN, *President.*
JOHN TROWBRIDGE, *Vice-President for Class I.*
HENRY P. WALCOTT, *Vice-President for Class II.*
JOHN C. GRAY, *Vice-President for Class III.*
EDWIN H. HALL, *Corresponding Secretary.*
WILLIAM WATSON, *Recording Secretary.*
CHARLES P. BOWDITCH, *Treasurer.*
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ELIOT C. CLARKE.

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"On a Simple Device for Reading the Deflections of a Mirror Galvanometer." By B. O. Peirce.

"The Luminescence of Fluorspar." By Harry W. Morse. Presented by John Trowbridge.

"An Experiment to detect the Fitzgerald-Lorentz Effect." By E. W. Morley and D. C. Miller.

"On Surface Tension at the Boundary between Liquids and Vapors." By Arthur L. Clark. Presented by A. G. Webster.

AMERICAN ACADEMY OF ARTS AND SCIENCES.

REPORT OF THE COUNCIL. — PRESENTED MAY 10, 1905.

BIOGRAPHICAL NOTICES.

GEORGE FRISBIE HOAR . . . . . THOMAS WENTWORTH HIGGINSON.
CHARLES STORER STORROW . . . HIRAM F. MILLS.

REPORT OF THE COUNCIL.

The Academy has lost eight members by death since the last report of the Council, May 11, 1904: four Resident Fellows, James M. Barnard, Samuel L. Abbot, George F. Hoar, and George S. Boutwell; four Associate Fellows, T. M. Drown, A. S. Packard, James C. Carter, and L. P. di Cesnola.

One Resident Fellow has resigned during the year.

No new members have been elected.

The roll of the Academy now includes 194 Resident Fellows, 96 Associate Fellows, and 73 Foreign Honorary Members.

GEORGE FRISBIE HOAR.

I BELIEVE it is Howells who somewhere remarks that one may easily hear two Bostonians at a club discussing a third person with the greatest freedom, after which one may be heard casually remarking to the other, "He is a cousin of mine." I might truly say the same either of Senator Hoar or of Senator Lodge, both of whom were descended from Francis Higginson, the early Salem clergyman. In case of Senator Hoar, I was some six years older and knew him first as a boy in college, he reaching Harvard College as I left; then I knew him as a young lawyer in Worcester, where we were fellow townsmen for a dozen years or so, and finally encountered him in relation to public questions, where we alternately agreed and differed for many years. The fact that some months have gone by since his funeral diminishes the peril of that merely good-natured praise which is the general instinct of our friendly nation when a prominent man passes away. Happening to be in England during the exciting days which followed the murder of President McKinley, I was constantly called on to explain how it was that the repeated criticism made upon him in America up to that time was so instantly followed by a chorus of what seemed rather undiscriminating praise, and I could only say that such was our American temperament that with us the applause came first and the more discriminating criticism afterwards.

George Frisbie Hoar was born at Concord, Mass., August 29, 1826, being the son of Samuel Hoar, a prominent lawyer, who was a Whig mem-

ber of Congress from 1835 to 1837, and was sent in 1844 by the Massachusetts legislature to South Carolina on an unsuccessful mission before the courts of that Southern State. George Frisbie Hoar's eldest brother Ebenezer Rockwood, had also been a member of Congress in 1873–75 and had been attorney-general of the United States. His grandfather and great-grandfather were both in the Concord fight, and his maternal ancestor, Roger Sherman, signed the Declaration of Independence — he who, as Whittier has said, represented "the gentle craft of leather." Senator Hoar became a resident fellow of this academy May 8, 1901 (Class III. Sec. 1. Philosophy and Jurisprudence). He died of disease at Worcester, Mass., September 30, 1904.

The immediate family to which Mr. Hoar belonged has been for several generations the most influential household in the most influential village of eastern Massachusetts. Such an attitude produces a race of men who are the counsellors and friends of their fellow townsmen and the recognized authority as to the character and claims of humbler men. This decision may or may not be infallible. I remember when, after the death of Henry Thoreau, I had applied in vain to his sister for leave to publish something from his numerous volumes of journals and natural observations, now so largely in print, she had refused, and I applied confidently to Judge Hoar. When I got through, the judge said placidly, between puffs of his cigar, "Whereunto? You have not yet unfolded the preliminary question. Why should any one wish to have a sentence of Henry Thoreau's put in print?" I am confident that no one in Concord would have had the daring to ask that question in regard to any member of the Hoar family, and it is clear that the author of the two stout volumes of Senator Hoar's memoirs could at least have felt no such solicitude in regard to himself.

It embarrasses the historic position of a man, however eminent, whenever he has recently published his autobiography. It may vindicate him from some injustice, but is apt to place him at some disadvantage. I knew a man who inscribed in his library, above the department of biography, that fatal saying of Confucius, "How can a man be concealed?" In many cases this unconscious revelation has its merits, but it involves its perils. I think it was Senator Depew who once said with much keenness that every man ought to write his own epitaph, because no one else is usually so familiar with the virtues of the deceased. We recognize this in Senator Hoar's memoirs, when, speaking of his service in the Massachusetts legislature, he says, "I suppose I may say without arrogance that I was the leader of the Free Soil Party in each House

when I was a member of it."* He leaves us glad to have the knowledge from high authority, but rather grateful that each one of his three hundred fellow members did not write his own biography in a thousand pages to impose on us the duty of reading them all. It rather reminds us of the young singer in the play who, after making her début, says with undoubted sincerity that she "and the orchestra" were very much applauded.

Those of us who were contemporaries of Senator Hoar in Harvard College turn naturally to the chapters in his book relating to that period, and find at the very outset some of this hasty generalization to which biography tempts. In the very first line of the chapter called "Harvard Sixty Years Ago" is a statement that Harvard had not changed much for nearly a century before he entered it. I graduated the same year that he entered, and can testify, on the other hand, that the basis of the whole transformation from the old prescribed system to the present elective system had been laid during those two or three years, in making mathematics an elective study, with the intention of making almost all other studies elective also, as they now are. His farther judgment in the matter can be estimated from the fact that the one department which he selects for censure and ridicule is that department of English which under Prof. Edward Tyrrel Channing — grand uncle of the present Edward Channing, Professor of History — gave Harvard the lead among all the academic rivals in America in the production of literary men. Channing's list of pupils, beginning with Emerson, included also Winthrop, Hillard, Holmes, Dana, Hildreth, Hedge, James Freeman Clarke, William Henry Channing, Rev. S. F. Smith, Sumner, Motley, the Adamses, the Lowells, the Peabodys, the Hales, the Quincys, President Hill, Francis Parkman, William Story, Fitzedward Hall, and finally Professor Norton; and yet this is the summary of it made by Senator Hoar. I myself, as one of Professor Channing's pupils, have been a literary man by profession for half a century, and it has sometimes seemed to me that forty-eight hours have never passed without there occurring to me, as a piece of second nature, some maxim of that teacher. I do not believe that there has occurred in American educational history a teacher so remarkable, all things considered. It was true, as Mr. Hoar cruelly remarks, that he had a figure somewhat like Punch, though I should say with a noble head above it.

The explanation of Senator Hoar's errors is comparatively simple.

* Hoar's Autobiography, I. 163.

On looking through the Commencement Day programme for 1845, a programme which gave among the new features lately introduced the departments in which each graduate took honors, we find that Senator Hoar, whose Commencement part lay among the "disquisitions," the lowest grade of rank, was credited only with Latin and Greek as the basis of his rank, such as it was. Now all experience indicates, I believe, that the department of study which a man thinks really important is that one for which he himself has a fancy. Some of you may have known, years ago, the German, Baron Osten Sacken, the celebrated entomologist, stationed in Cambridge for a time, who always complained that he had made a fatal mistake in his career through rashly taking the whole of the diptera, or two-winged insects, for his scientific task, whereas to take charge of a single genus would have been enough, he thought, for the life-work of a judicious man of science; personally he should have preferred the mosquito.

After leaving the Law School, Mr. Hoar established himself in Worcester, Mass., then a city of remarkable activity of mind and independence of thought. Going there myself four years later, I recognized him, of course, as one of the leaders of the young men, though less conspicuously so, I think, than he seems to himself to have been, his narrative still rather omitting the orchestra. I remember clearly that Mr. John Milton Earle, editor of the "Worcester Spy," and then recognized as the leader among the older men in politics and journalism, placed others among the young lawyers, especially the one who afterwards became Judge Nelson, far above Hoar. This of course lies beyond my province. But the defect I find in Senator Hoar's picture of that day is that he overlooks the most remarkable historic transformation, I think, which ever occurred in a Massachusetts town.

Up to about that time Worcester had simply afforded a fine example of the old-fashioned, high-bred, well-organized Massachusetts community. It was ruled with dignity by what was called the Chandler blood, — the Lincolns, the Salisburys, the Waldos, and one or two kindred households. In a short time a change passed over it, almost as if by magic, with the enormous influx of manufacturers. The Abolitionists, the temperance zealots, the social reformers generally, began to congregate there. From being another Quincy it became another Lynn. The Public Library sprang up and a lecture system, a Natural History Society, a gymnasium; the young men of the town became athletic and interchanged cricket games and baseball games with other towns. The neighborhood of those fine old radicals, Stephen and Abby Foster, made it a

centre for anti-slavery meetings and fugitive slave cases. Abby Kelly Foster was at that time the pioneer woman-speaker in New England, and Stephen Foster was one of the best known farmers of the neighborhood. His farm was originally of very hard soil and later was made into a fertile one by his efforts, and once when I asked him why he did not take a farm in a Western state instead, he remarked that he should hate to put his spade into the ground and not have it strike against a rock. Yet there is no mention in these two thick volumes of such stalwart neighbors as these. All this social upheaval was going on in the early days of Mr. Hoar's residence there. The peculiarity of the case is that one may look through the two large volumes of his memoirs and scarcely find allusion to all these curious phenomena. Indeed, he says at the outset (I. 159) that there was "little pride of family or wealth in Worcester," when he went there; thus omitting the key to the whole situation.

It was in 1868 that Senator Hoar began his more national public career by being nominated to the lower house of Congress from Worcester. I remember that on meeting his elder brother, Judge Hoar, in a smoking car the next day, I congratulated him on the result of the caucus. He replied that it was peculiarly satisfactory from the fact that all the modes of manœuvring supposed to belong to politics had been entirely prohibited by his brother, whereas Mr. Francis W. Bird, his leading opponent, was well known as a past-master in them. Being somewhat acquainted with the ways of political life in Worcester County, I felt some misgiving at the completeness of this praise, and having an opportunity, not long after, to meet Mr. William W. Rice, George Hoar's brother-in-law, who had personally conducted the campaign, I asked him frankly whether he thought the difference was really so great. He answered with a twinkle in his eye, "Well, I guess there was not much left undone on either side." I must say candidly that I think the same allowance is to be made throughout Senator Hoar's personal memoirs; you can rely on having in full his own point of view on what concerns himself, but you are not quite sure of the rest. He represented, undoubtedly, in this respect the whole tone of older politicians, yet he, too, when he wished to carry a point, did not leave much undone.

A cordial friend and warm admirer and vindicator of all his friends, he was as cordial a hater. To those who took part in the great secession from the Republican Party which put President Cleveland for the first time in office, he held a bitterness of antagonism hardly equalled among Republican leaders, and the slang word "Mugwump," which had but a

short-lived run in the newspapers, became to him a permanent weapon. To the latest day of his life he applied it to all who took part in that outbreak, and seemed to regard it as in itself a sufficient condemnation.

This was also true, though not so largely, of his relation to all Democrats. It was the general testimony of General Butler's friends, for instance, that he was helped and not hindered in his political efforts by the unmerciful and undiscriminating manner in which both Senator Hoar and his brother Judge Hoar attacked him in conventions; and one has only to read the long chapter on this subject in Senator Hoar's autobiography to see how largely this was a matter of temperament and an advocate's argument, not a judge's summing up. He does some slight justice to the real services of Butler's prompt adhesion to the war side, carrying the Democratic Party with him in Massachusetts; and, on the other hand, while bringing out, as was fair enough, the general tone of trickiness which spoiled that demagogue's course, he reserves his chief and overwhelming condemnation for Butler's retreat from his first attack on Petersburg, though a little wider inquiry would have satisfied him that this was one of the few occasions where that general was probably right. I know that Col. William Lamb, who commanded Fort Fisher until its fall, always testified that Butler himself was entirely justified in this, that the resources in his hands — especially the naval forces — were wholly inadequate to success, and that the general who followed him was more fortunate simply because he was better provided. Should General Butler ever attain to a statue in the Boston State House, it will be owing largely to the unfairness of a class of bitter opponents of which the Hoar brothers were the leaders.

These were the perils that belonged to Mr. Hoar's temperament. His long and honorable course of independence is nowhere so well exhibited as in an article by Mr. Talcott Williams of Philadelphia, one of the very ablest of American writers, in the "American Monthly Review of Reviews" for November, 1904. Mr. Williams, the first writer to place Mr. Hoar's claims at the highest, is also the first to speak with perfect frankness of his personal faults. He says, "He had many faults. Quick-tempered, he had the impatience over slower and more pliable men frequent in those of high intellectual powers. In his early years of service, he had his share of egotism, not unnatural. He was not at his best in making it easy for his colleagues to get on with him, and he lacked in tact, affronting men by a lofty superiority, to himself unconscious, and to other men sometimes seeming to be self-conscious. He displayed, in short, and particularly before he had reached the full stat-

ure of his statesmanship, just the qualities which should have alienated support. He outgrew these faults, as he showed best by his jests about them."

All this is true and candid. Mr. Williams's error comes, I think, in assuming it as the highest merit attributable to a public man that he had invariably stood by his party in the end, however he might criticise it. Not such was the standard of merit of the earlier teachers, the Conscience Whigs, who first taught Senator Hoar the path of freedom. Charles Sumner, Charles Francis Adams, John G. Palfrey, — these were the men who first brought him into public life by showing the higher strength required to forsake one's party. In the first impulse of youth he had done this, but in later life he showed it to be often, in the long run, impossible for him to make the required sacrifice. So far as his speeches went, no one can doubt that they had plenty of pluck in them.

A man, after all, judges himself in his autobiography. It will one day be recognized that in an age of great self-devotion and great sacrifices, Senator Hoar made many small sacrifices, but no large ones; and was amply rewarded by filling in return, for the greater part of his active life, the position held highest by all American public men, — higher than even that of President, as being more permanent. It is absurd to compare his career for an instant with that of Sumner in respect to sacrifices, any more than in regard to scholarship; or with the lifelong sacrifice made by a man like Wendell Phillips, for whom Mr. Hoar frankly expressed his want of sympathy. Wendell Phillips was incomparably the superior of all around him in requisite ability for public life. There were occasions when there was needed only the slightest sacrifice of principle in him to be the head of a successful party and to be launched in that official career for which every attribute in him except conscience longed. I myself know by his own testimony that it was for this public life alone he yearned, but he forbore it. To those who knew the period and place which Mr. Hoar's autobiography describes, there is something almost pathetic in the types of men whom he holds up to admirers in Worcester — second-rate politicians, of whom he makes heroes — and, on the other hand, in the importance attached to the rescue of a frightened slave-catcher by a gathering of men, half in play, who piloted him to the railway station.

The severe test usually came later with Senator Hoar as the moment for voting drew near. Meeting with direct and unequivocal opposition, he was only strengthened by it. Reiterate it, and he sometimes came to re-

semble his elder brother the judge, who was thus described in one of those piquant analyses in which the late Col. Henry Lee delighted, "strong, but would swear that black was white if contraried." No public man in America ever found himself in a more lamentable position than did Senator Hoar when Senator Foraker began to exhibit the "deadly parallel" between the Massachusetts senator's Panama speech of December 17, 1903, and that of February 22, 1904. It recalled the statement long since attributed to President McKinley, "Senator Hoar is the man who furnishes our opponents with their arguments and us with his votes." "It was," said the "New York Evening Post," speaking of the Senator's change, "a moral eclipse visible all over the United States." "It was," said the New York Commercial Advertiser" (Republican), an exhibition "with the facile grace of lifelong practice of his 'right about face';" or, as the "Providence Journal" (Republican) more tersely said, "The worthy Massachusetts statesman once more went to dinner when the dinner bell rang." Not that he cared so much for the actual dinner, but it came hard to him to see his old table mates sitting down without him.

It sometimes happens that the best test of a public man throughout his life is not to be found in his main or official functions, but in collaterals, in matters where he was entirely free and could be judged by his wholly volunteer action. My own admiration for Mr. Hoar, for I have my share of admiration, has rested largely upon his willingness to take up unpopular causes which could yield him nothing, but rather led to criticism. His loyalty to Woman's Suffrage, for instance, brought him little more than censure or ridicule; it may have cost him votes; it is pretty certain that it yielded him none. The same was true of his unvarying justice for the Roman Catholic church and to the Irish-American race. It was repaid in a warm personal loyalty on the part of those whose cause he espoused, but his political success was in spite of these things, not because of them. It is quite needless, on the other hand, to reproduce the long list of his special public services. Most important of all these is the crowning fact that upon the great national question which dwarfed all others in his very latest years, — that of imperialism as shown in the Philippines, — he held his course with superb courage and was true to the last; being almost alone in the Senate in what he deemed the most momentous of all causes, that of saving the nation from dwindling into an empire. For this he might well be received, as he was, with applauses such as those amid which the ancient Roman senators marched forth from the city to meet the Consul Terentius Varro, after his army had been almost annihilated by Hannibal at the great battle of Cannæ.

The Roman senate went out to do him honor, Livy tells us, because, though he had lost all else, he had not despaired of the republic.

THOMAS WENTWORTH HIGGINSON.

CHARLES STORER STORROW.

CHARLES S. STORROW was my friend, and the friend of three generations of men with whom he was associated, inspiring them with the spirit of gentleness, truthfulness, honorable dealing, thoroughness, and a careful consideration of all sides of a subject that justice might be reached.

Of Massachusetts parentage, he was born March 25, 1809, during the temporary residence of his parents in Montreal. When he was about two years of age they returned to their former home in Boston, where he received his early education until 1818, when his father, Thomas Wentworth Storrow, having established himself in business in Paris, France, took his family there for permanent residence. There he attended private school until 1824, when he returned to America to prepare for Harvard College, where he was graduated first in his class in 1829.

Having determined to adopt the profession of civil engineering, and finding no school in this country where he could obtain the necessary education, he studied for some months in the library of the eminent engineer Loammi Baldwin, but in December he returned to France, and by the influence of General Lafayette, who was a close friend of his father's family, he got permission to take the course in the École des Ponts et Chaussées at Paris. Here he remained two years, taking the course, and also made a study of the important engineering works then in progress in and about Paris, and, before returning to America, made a tour for more than two months throughout Great Britain, mainly to study various works interesting to his profession, including the Liverpool and Manchester Railway, then recently completed by Stephenson.

Returning to Boston in April, 1832, he entered the engineering staff of the Boston and Lowell Railroad, of which Mr. James F. Baldwin was chief engineer. Constructive work was then beginning, and Mr. Storrow served in the engineer corps until the road was completed. When entering upon this work he was the only one engaged who had seen a locomotive.

On May 27, 1835, under his direction, the first train, drawn by the locomotive "Stephenson," carried a party of the leading stockholders

from Boston to Lowell and back at the rate of twenty miles an hour. Soon after the road was opened to the public, and in 1836 Mr. Storrow was made the chief official of the road under the title of agent, and managed its affairs for the next nine years.

He had a keen appreciation of justness, and while he insisted that others should be just to the company which he controlled, he was careful that his company should be just to others. Soon after the road was opened to travel, a passenger entered a car after the seats were all occupied. He demanded of the conductor a seat, saying that his ticket entitled him to a seat and he must have one. The conductor told him there would probably be an empty seat a short distance out, but that he could not ask any one to get up and give him a seat; not satisfied, he rushed out of the car as it started, and complained to the depot master that the conductor would not give him the seat to which his ticket entitled him. The depot master took him to Mr. Storrow. The passenger complained excitedly of his treatment by the railroad. Mr. Storrow quietly heard him through, then, turning to the depot master, said, "This railroad was built for the accommodation of the public; this gentleman is entitled to a seat; you may heat up the other engine and take him to Lowell." In this spirit of regarding the rights of others did he begin the railroad business of New England.

While engaged upon the construction of the railroad, his leisure time was devoted to the improvement of his profession in America by preparing a "Treatise on Water Works for Conveying and Distributing Supplies of Water," published in 1835; first giving to English-speaking engineers the results of experiments made by the French engineers and their methods of solving problems on the flow of water in canals and in pipes, and including the discussion, in a very clear and complete manner, of the various problems arising in constructing water works supplied by gravity or by pumping.

On October 3, 1836, Mr. Storrow was married to Miss Lydia Cabot Jackson, daughter of Dr. James Jackson of Boston, and their home for nine years was in Boston.

On March 20, 1845, at the request of Mr. Abbott Lawrence, Mr. Storrow gave up the management of the Boston and Lowell Railroad and took charge of the affairs of the Essex Company, a land and water-power company organized to develop the water power of the Merrimack River for manufacturing purposes, and to lay out and begin the building of a city, which has become the city of Lawrence, with its seventy thousand inhabitants.

Mr. Lawrence was made president, and Mr. Storrow was made treasurer, engineer, and agent of the company. Mr. Storrow had a very broad appreciation of the work before him, and planned wisely for the long future. He designed and built the dam across the river, — an engineering structure of high merit, built in a manner much in advance of the time, consisting of granite masonry laid in cement upon ledge, giving a direct fall of 25 feet, with an overfall 900 feet in length, with wing walls rising 16 feet above the crest, and wing dams to this height extending 1800 feet farther to high land, which have served to protect the city from great freshets.

He designed the canals and laid out the mill sites, both well adapted to the full development of the power of the river. He built several of the large mills, and bore the responsibility of building and carrying on several manufacturing establishments. He laid out the city, planned and built broad streets lined with shade-trees, and provided several public parks, which were afterwards given to the city. He was active in establishing public schools of a high order, and helpful in establishing churches for all of the people, and in 1853, when the charter of the city was obtained, the people made him their first mayor.

Intimate association with Mr. Storrow, and recognition that his education and training qualified him in an unusual degree for directing great and diversified enterprises, caused Mr. Abbott Lawrence to consult with him as to what was needed in a school for educating engineers.

The remarkable letter of Mr. Abbott Lawrence of June 7, 1847, to the treasurer of Harvard College, presents his views of the pressing want in our country "of an increased number of men educated in the practical sciences," and offers a foundation for "a school, not for boys, but for young men whose early education is completed, either in college or elsewhere, and who intend to enter upon an active life as engineers or chemists, or, in general, as men of science, applying their attainments to practical purposes," and goes on to describe as few men, even among engineers then in the world, could have described the essentials of an engineering school having three departments, "1st, Engineering; 2d, Mining in its extended sense, including metallurgy; 3d, the invention and manufacture of machinery." He includes the important provision that "this school of science should number among its teachers men who have practised and are practising the arts they are called to teach." Mr. Lawrence urged Mr. Storrow to take the general direction of the Lawrence Scientific School and to accept its professorship of Engineering; but he was too earnestly engaged in the work in hand to undertake it.

For fifteen years, while details of his work required daily attention, Mr. Storrow resided in Lawrence, but in 1860 he moved his home to Boston.

In 1861 the Governor of the Commonwealth appointed Mr. Storrow one of the commissioners to determine the effect of the dam at North Billerica in flowing the Concord and Sudbury meadows.

In 1862 Mr. Storrow, at the request of the Commissioners of the Hoosac Tunnel, with the approval of the Governor and Council, visited Europe to examine the most important tunnels, and especially that one then in progress under the Alps between France and Italy; and on November 28, 1862, he made to the Commissioners a very complete report upon European tunnels, and bearing especially upon the method of constructing the Mont Cenis tunnel with the help of compressed air in drilling and ventilating, together with his conclusions in regard to the size and method of working to be adopted at the Hoosac Tunnel.

This model report of one hundred and twenty pages was published in Senate Document No. 93 of 1863. Following this, Mr. Storrow was consulting engineer on hydraulic work for this commission.

On December 11, 1876, he was appointed one of the park commissioners of the city of Boston, serving until his resignation on May 19, 1879, when he had become seventy years of age.

Mr. Storrow's generous consideration and kindness to his assistants, and to all in his service of whatever grade, together with his manner of expressing his interest, caused them universally to feel that he was the most gentlemanly of men.

Mr. Storrow continued actively engaged with the affairs of the Essex Company until he was eighty years of age, when he resigned, and the stockholders made up their record as follows:

"The retirement, upon reaching the age of eighty years, of our venerable president, after wisely leading the company from its organization for forty-four years, causes the stockholders to recall the eminent services Mr. Storrow has rendered to the Essex Company.

"For twenty-four years he was treasurer, agent, and chief engineer, carrying the important responsibilities of designing its works, directing their execution, and managing all of its business affairs.

"Thirteen years more he continued as treasurer and agent, directing its business management wisely and with remarkable success; and upon resigning these offices continued to serve the company as director and as president.

"The stockholders desire to express to him their gratitude, as well as

their high appreciation of the honor and ability with which he has founded a prosperous city and carried this company through its years of struggle to prosperity."

For ability as an engineer and eminent service to the profession in America, Mr. Storrow was, in December, 1892, elected an Honorary Member of the American Society of Civil Engineers.

Mr. Storrow has been a Fellow of the American Academy of Arts and Sciences sixty-four years, having been elected January 29, 1840.

Always courteous and remarkably vivacious, with helpful cheeriness, happy in seeing his children and grandchildren in honorable and sometimes in distinguished positions in the community, he spent the latter years of his very long life in the quiet enjoyment of his home and his books, until his death on April 30, 1904, in his ninety-sixth year.

HIRAM F. MILLS.

American Academy of Arts and Sciences.

OFFICERS AND COMMITTEES FOR 1905-06.

PRESIDENT.

WILLIAM W. GOODWIN.

VICE-PRESIDENT.

Class I.	Class II.	Class III.
JOHN TROWBRIDGE,	HENRY P. WALCOTT,	JOHN C. GRAY.

CORRESPONDING SECRETARY.

EDWIN H. HALL.

RECORDING SECRETARY.

WILLIAM WATSON.

TREASURER.

CHARLES P. BOWDITCH.

LIBRARIAN.

A. LAWRENCE ROTCH.

COUNCILLORS.

Class I.	Class II.	Class III.
LEWIS J. JOHNSON,	EDWARD H. BRADFORD, *Terms expire* 1906.	MORRIS H. MORGAN,
ELIHU THOMSON,	WILLIAM T. SEDGWICK, *Terms expire* 1907.	JOHN H. WRIGHT,
WALLACE C. SABINE,	WILLIAM G. FARLOW, *Terms expire* 1908.	EDWARD ROBINSON.

COMMITTEE OF FINANCE.

WILLIAM W. GOODWIN, CHARLES P. BOWDITCH, ELIOT C. CLARKE.

RUMFORD COMMITTEE.

CHARLES R. CROSS, *Chairman*,

ERASMUS D. LEAVITT,	EDWARD C. PICKERING,	AMOS E. DOLBEAR,
ARTHUR G. WEBSTER,	THEODORE W. RICHARDS,	ELIHU THOMSON.

C. M. WARREN COMMITTEE.

LEONARD P. KINNICUTT, *Chairman*,

ROBERT H. RICHARDS,	SAMUEL CABOT,	ARTHUR M. COMEY,
ARTHUR MICHAEL,	HENRY P. TALBOT,	CHARLES R. SANGER.

COMMITTEE OF PUBLICATION.

EDWARD L. MARK, of Class II., *Chairman*,

SETH C. CHANDLER, of Class I., CRAWFORD H. TOY, of Class III.

COMMITTEE ON THE LIBRARY.

A. LAWRENCE ROTCH, *Chairman*,

HARRY M. GOODWIN, of Class I., SAMUEL HENSHAW, of Class II.,

HENRY W. HAYNES, of Class III.

AUDITING COMMITTEE.

HENRY G. DENNY, FREDERICK J. STIMSON.

LIST

OF THE

FELLOWS AND FOREIGN HONORARY MEMBERS.

(Corrected to June 1, 1905.)

RESIDENT FELLOWS. — 194.

(Number limited to two hundred.)

Class I. — *Mathematical and Physical Sciences.* — 78.

Section I. — 18.

Mathematics and Astronomy.

Solon I. Bailey,	Cambridge.
Maxime Bôcher,	Cambridge.
William E. Byerly,	Cambridge.
Seth C. Chandler,	Wellesley Hills.
Gustavus Hay,	Boston.
Percival Lowell,	Boston.
James Mills Peirce,	Cambridge.
Edward C. Pickering,	Cambridge.
William H. Pickering,	Cambridge.
Henry S. Pritchett,	Boston.
John Ritchie, Jr.,	Roxbury.
Edwin F. Sawyer,	Brighton.
Arthur Searle,	Cambridge.
William E. Story,	Worcester.
Henry Taber,	Worcester.
Harry W. Tyler,	Boston.
O. C. Wendell,	Cambridge.
P. S. Yendell,	Dorchester.

Section II. — 24.

Physics.

A. Graham Bell,	Washington, D.C.
Clarence J. Blake,	Boston.
Francis Blake,	Weston.
George A. Campbell,	Boston.
Harry E. Clifford,	Newton.
Charles R. Cross,	Brookline.
Amos E. Dolbear,	Somerville.
A. W. Duff,	Worcester.
H. M. Goodwin,	Roxbury.
Edwin H. Hall,	Cambridge.
Hammond V. Hayes,	Cambridge.
William L. Hooper,	Somerville.
William W. Jacques,	Newton.
Frank A. Laws,	Boston.
Henry Lefavour,	Boston.
Theodore Lyman,	Brookline.
Benjamin O. Peirce,	Cambridge.
A. Lawrence Rotch,	Boston.
Wallace C. Sabine,	Boston.
John S. Stone,	Boston.
Elihu Thomson,	Swampscott
John Trowbridge,	Cambridge.
A. G. Webster,	Worcester.
Robert W. Willson,	Cambridge.

Section III. — 20.

Chemistry.

Samuel Cabot,	Boston.

Arthur M. Comey,	Cambridge.
James M. Crafts,	Boston.
Charles W. Eliot,	Cambridge.
Charles L. Jackson,	Cambridge.
Walter L. Jennings,	Worcester.
Leonard P. Kinnicutt,	Worcester.
Charles F. Mabery,	Cleveland, O.
Arthur Michael,	Boston.
George D. Moore,	Worcester.
John U. Nef,	Chicago, Ill.
Arthur A. Noyes,	Boston.
Robert H. Richards,	Jamaica Plain.
Theodore W. Richards,	Cambridge.
Charles R. Sanger,	Cambridge.
Stephen P. Sharples,	Cambridge.
Francis H. Storer,	Boston.
Henry P. Talbot,	Newton.
Charles H. Wing,	Ledger, N. C.
Edward S. Wood,	Boston.

SECTION IV. — 16.

Technology and Engineering.

Alfred E. Burton,	Boston.
Eliot C. Clarke,	Boston.
Heinrich O. Hofman,	Jamaica Plain.
Ira N. Hollis,	Cambridge.
L. J. Johnson,	Cambridge.
Gaetano Lanza,	Boston.
E. D. Leavitt,	Cambridge.
William R. Livermore,	New York.
Hiram F. Mills,	Lowell.
Cecil H. Peabody,	Brookline.
Andrew H. Russell,	Manila.
Albert Sauveur,	Cambridge.
Peter Schwamb,	Arlington.
H. L. Smyth,	Cambridge.
George F. Swain,	Boston.
William Watson,	Boston.

CLASS II. — *Natural and Physiological Sciences.* — 65.

SECTION I. — 15.

Geology, Mineralogy, and Physics of the Globe.

H. H. Clayton,	Milton.
Algernon Coolidge,	Boston.
William O. Crosby,	Jamaica Plain.
William M. Davis,	Cambridge.
Benj. K. Emerson,	Amherst.
O. W. Huntington,	Newport, R. I.
Robert T. Jackson,	Cambridge.
T. A. Jaggar, Jr.,	Cambridge.
William H. Niles,	Cambridge.
Charles Palache,	Cambridge.
John E. Pillsbury,	Boston.
Nathaniel S. Shaler,	Cambridge.
Robert DeC. Ward,	Cambridge.
John E. Wolff,	Cambridge.
J. B. Woodworth,	Cambridge.

SECTION II. — 11.

Botany.

F. S. Collins,	Malden.
Geo. E. Davenport,	Medford.
William G. Farlow,	Cambridge.
Charles E. Faxon,	Jamaica Plain.
Merritt L. Fernald,	Cambridge.
George L. Goodale,	Cambridge.
John G. Jack,	Jamaica Plain.
B. L. Robinson,	Cambridge.
Charles S. Sargent,	Brookline.
Arthur B. Seymour,	Cambridge.
Roland Thaxter,	Cambridge.

SECTION III. — 24.

Zoölogy and Physiology.

Alexander Agassiz,	Cambridge.
Robert Amory,	Boston.

Henry P. Bowditch,	Jamaica Plain.
William Brewster,	Cambridge.
Louis Cabot,	Brookline.
William E. Castle,	Cambridge.
Samuel F. Clarke,	Williamstown.
W. T. Councilman,	Boston.
Charles B. Davenport,	Cold Spring Harbor, N. Y.
Harold C. Ernst,	Jamaica Plain.
Edward G. Gardiner,	Boston.
Samuel Henshaw,	Cambridge.
Theodore Hough,	Boston.
John S. Kingsley,	Somerville.
Edward L. Mark,	Cambridge.
Charles S. Minot,	Milton.
Edward S. Morse,	Salem.
George H. Parker,	Cambridge.
William T. Porter,	Boston.
James J. Putnam,	Boston.
Samuel H. Scudder,	Cambridge.
William T. Sedgwick,	Boston.
James C. White,	Boston.
William M. Woodworth,	Cambridge.

SECTION IV. — 15.

Medicine and Surgery.

Edward H. Bradford,	Boston.
Arthur T. Cabot,	Boston.
David W. Cheever,	Boston.
Frank W. Draper,	Boston.
Thomas Dwight,	Nahant.
Reginald H. Fitz,	Boston.
Charles F. Folsom,	Boston.
Frederick I. Knight,	Boston.
Samuel J. Mixter,	Boston.
W. L. Richardson,	Boston.
Theobald Smith,	Jamaica Plain.
O. F. Wadsworth,	Boston.
Henry P. Walcott,	Cambridge.
John C. Warren,	Boston.
Francis H. Williams,	Boston.

CLASS III. — *Moral and Political Sciences.* — 51.

SECTION I. — 10.

Philosophy and Jurisprudence.

James B. Ames,	Cambridge.
John C. Gray,	Boston.
G. Stanley Hall,	Worcester.
Francis C. Lowell,	Boston.
Hugo Münsterberg,	Cambridge.
Josiah Royce,	Cambridge.
Jeremiah Smith,	Cambridge.
Frederic J. Stimson,	Dedham.
Edward H. Strobel,	Cambridge.
Samuel Williston,	Belmont.

SECTION II. — 22.

Philology and Archæology.

Charles P. Bowditch,	Jamaica Plain.
Lucien Carr,	Cambridge.
Franklin Carter,	Williamstown.
Joseph T. Clarke,	Harrow, Eng.
Henry G. Denny,	Roxbury.
William Everett,	Quincy.
J. W. Fewkes,	Washington.
William W. Goodwin,	Cambridge.
Henry W. Haynes,	Boston.
Charles R. Lanman,	Cambridge.
David G. Lyon,	Cambridge.
Morris H. Morgan,	Cambridge.
Bennett H. Nash,	Boston.
Frederick W. Putnam,	Cambridge.
Edward Robinson,	Boston.
Edward S. Sheldon,	Cambridge.
Herbert Weir Smyth,	Cambridge.
F. B. Stephenson,	Boston.
Crawford H. Toy,	Cambridge.
John W. White,	Cambridge.
John H. Wright,	Cambridge.
Edward J. Young,	Waltham.

SECTION III. — 10.

Political Economy and History.

Charles F. Adams,	Lincoln.
Edward Atkinson,	Brookline.
Andrew McF. Davis,	Cambridge.
Ephraim Emerton,	Cambridge.
A. C. Goodell,	Salem.
Henry C. Lodge,	Nahant.
A. Lawrence Lowell,	Boston.
James F. Rhodes,	Boston.
Charles C. Smith,	Boston.
F. W. Taussig,	Cambridge.

SECTION IV. — 9.

Literature and the Fine Arts.

Francis Bartlett,	Boston.
John Bartlett,	Cambridge.
Arlo Bates,	Boston.
T. W. Higginson,	Cambridge.
George L. Kittredge,	Cambridge.
Charles Eliot Norton,	Cambridge.
Denman W. Ross,	Cambridge.
William R. Ware,	Milton.
Barrett Wendell,	Boston.

ASSOCIATE FELLOWS. — 97.

(Number limited to one hundred. Elected as vacancies occur.)

Class I. — *Mathematical and Physical Sciences.* — 37.

Section I. — 14.

Mathematics and Astronomy.

Edward E. Barnard,	Williams Bay,
S. W. Burnham,	Chicago. [Wis.
George Davidson,	San Francisco.
Fabian Franklin,	Baltimore.
Asaph Hall,	Goshen, Conn.
George W. Hill,	W. Nyack, N.Y.
E. S. Holden,	New York.
Emory McClintock,	Morristown, N.J.
E. H. Moore,	Chicago.
Simon Newcomb,	Washington.
Charles L. Poor,	New York.
George M. Searle,	Washington.
J. N. Stockwell,	Cleveland, O.
Chas. A. Young,	Princeton, N. J.

Section II. — 6.

Physics.

Carl Barus,	Providence, R.I.
G. E. Hale,	Williams Bay, Wis.
S. P. Langley,	Washington.
T. C. Mendenhall,	Worcester.
A. A. Michelson,	Chicago.
E. L. Nichols,	Ithaca, N. Y.

Section III. — 9.

Chemistry.

Wolcott Gibbs,	Newport, R.I.
Frank A. Gooch,	New Haven.
Eugene W. Hilgard,	Berkeley, Cal.
S. W. Johnson,	New Haven.
J. W. Mallet,	Charlottesville, Va.
E. W. Morley,	Cleveland, O.
Charles E. Munroe,	Washington.
J. M. Ordway,	New Orleans.
Ira Remsen,	Baltimore.

Section IV. — 8.

Technology and Engineering.

Henry L. Abbot,	Cambridge.
Cyrus B. Comstock,	New York. [Va.
W. P. Craighill,	Charlestown, W.
John Fritz,	Bethlehem, Pa.
James D. Hague,	New York.
F. R. Hutton,	New York.
William Sellers,	Edge Moor, Del.
Robt. S. Woodward,	New York.

Class II. — *Natural and Physiological Sciences.* — 33.

Section I. — 11.

Geology, Mineralogy, and Physics of the Globe.

Cleveland Abbe,	Washington.
George J. Brush,	New Haven.
T. C. Chamberlin,	Chicago.
Edward S. Dana,	New Haven.
Walter G. Davis,	Cordova, Arg.
Samuel F. Emmons,	Washington.
G. K. Gilbert,	Washington.
S. L. Penfield,	New Haven.
R. Pumpelly,	Newport, R.I.
Israel C. Russell,	Ann Arbor.
Charles D. Walcott,	Washington.

SECTION II. — 6.

Botany.

L. H. Bailey,	Ithaca, N. Y.
D. H. Campbell,	Palo Alto, Cal.
J. M. Coulter,	Chicago.
C. G. Pringle,	Charlotte, Vt.
John D. Smith,	Baltimore.
W. Trelease,	St. Louis.

SECTION III. — 8.

Zoölogy and Physiology.

Joel A. Allen,	New York.
W. K. Brooks,	Lake Roland, Md.
F. P. Mall,	Baltimore.
S. Weir Mitchell,	Philadelphia.
H. F. Osborn,	New York.
A. E. Verrill,	New Haven.
C. O. Whitman,	Chicago.
E. B. Wilson,	New York.

SECTION IV. — 8.

Medicine and Surgery.

John S. Billings,	New York.
W. S. Halsted,	Baltimore.
Abraham Jacobi,	New York.
W. W. Keen,	Philadelphia.
William Osler,	Oxford, Eng.
T. Mitchell Prudden,	New York.
Wm. H. Welch,	Baltimore.
H. C. Wood,	Philadelphia.

CLASS III. — *Moral and Political Sciences.* — 27.

SECTION I. — 6.

Philosophy and Jurisprudence.

Joseph H. Choate,	New York.
Melville W. Fuller,	Washington.
William W. Howe,	New Orleans.
Charles S. Peirce,	Milford, Pa.
G. W. Pepper,	Philadelphia.
T. R. Pynchon,	Hartford, Conn.

SECTION II. — 7.

Philology and Archæology.

Timothy Dwight,	New Haven.
B. L. Gildersleeve,	Baltimore.
D. C. Gilman,	Baltimore.
T. R. Lounsbury,	New Haven.
Rufus B. Richardson,	New York.
Thomas D. Seymour,	New Haven.
A. D. White,	Ithaca, N.Y.

SECTION III. — 7.

Political Economy and History.

Henry Adams,	Washington.
G. P. Fisher,	New Haven.
Arthur T. Hadley,	New Haven.
Henry C. Lea,	Philadelphia.
Alfred T. Mahan,	New York.
H. Morse Stephens,	Ithaca.
W. G. Sumner,	New Haven.

SECTION IV. — 7.

Literature and the Fine Arts.

James B. Angell,	Ann Arbor, Mich.
H. H. Furness,	Wallingford, Pa.
R. S. Greenough,	Florence.
Herbert Putnam,	Washington.
Augustus St. Gaudens,	Windsor, Vt.
John S. Sargent,	London.
E. C. Stedman,	Bronxville, N. Y.

FOREIGN HONORARY MEMBERS. — 73.

(Number limited to seventy-five. Elected as vacancies occur.)

Class I. — *Mathematical and Physical Sciences.* — 25.

Section I. — 8.

Mathematics and Astronomy.

Arthur Auwers,	Berlin.
George H. Darwin,	Cambridge.
Sir William Huggins,	London.
Felix Klein,	Göttingen.
Émile Picard,	Paris.
H. Poincaré,	Paris.
Otto Struve,	Karlsruhe.
H. C. Vogel,	Potsdam.

Section II. — 6.

Physics.

Ludwig Boltzmann,	Vienna.
Oliver Heaviside,	Newton Abbot.
F. Kohlrausch,	Marburg.
Joseph Larmor,	Cambridge.
Lord Rayleigh,	Witham.
Joseph J. Thomson,	Cambridge.

Section III. — 6.

Chemistry.

Adolf Ritter von Baeyer,	Munich.
Marcellin Berthelot,	Paris.
J. H. van't Hoff,	Berlin.
D. Mendeleeff,	St. Petersburg.
Sir H. E. Roscoe,	London.
Julius Thomsen,	Copenhagen.

Section IV. — 5.

Technology and Engineering.

Sir Benjamin Baker,	London.
Lord Kelvin,	Largs.
Maurice Lévy,	Paris.
H. Müller-Breslau,	Berlin.
W. Cawthorne Unwin,	London.

Class II. — *Natural and Physiological Sciences.* — 25.

Section I. — 6.

Geology, Mineralogy, and Physics of the Globe.

Sir Archibald Geikie,	London.
Julius Hann,	Vienna.
Albert Heim,	Zurich.
Sir John Murray,	Edinburgh.
Freih. v. Richthofen,	Berlin.
Henry C. Sorby,	Sheffield.

Section II. — 6.

Botany.

E. Bornet,	Paris.
A. Engler,	Berlin.
Sir Joseph D. Hooker,	Sunningdale.
W. Pfeffer,	Leipsic.
H. Graf zu Solms-Laubach,	Strassburg.
Eduard Strasburger,	Bonn.

SECTION III.—6.

Zoölogy and Physiology.

Sir Michael Foster,	Cambridge.
Ludimar Hermann,	Königsberg.
A. von Kölliker,	Würzburg.
H. Kronecker,	Bern.
E. Ray Lankester,	London.
Elias Metschnikoff,	Paris.

SECTION IV.—7.

Medicine and Surgery.

Emil von Behring,	Marburg.
Sir T. L. Brunton,	London.
A. Celli,	Rome.
Sir V. A. H. Horsley,	London.
R. Koch,	Berlin.
Lord Lister,	London.
F. v. Recklinghausen,	Strassburg.

CLASS III.—*Moral and Political Sciences.*—23.

SECTION I.—5.

Philosophy and Jurisprudence.

A. J. Balfour,	Prestonkirk.
Heinrich Brunner,	Berlin.
A. V. Dicey,	Oxford.
F. W. Maitland,	Cambridge.
Sir Frederick Pollock, Bart.,	London.

SECTION II.—7.

Philology and Archæology.

Ingram Bywater,	Oxford.
F. Delitzsch,	Berlin.
W. Dörpfeld,	Athens.
Sir John Evans,	Hemel Hempstead.
H. Jackson,	Cambridge.
J. W. A. Kirchhoff,	Berlin.
G. C. C. Maspero,	Paris.

SECTION III.—5.

Political Economy and History.

James Bryce,	London.
Adolf Harnack,	Berlin.
Sir G. O. Trevelyan, Bart.,	London.
John Morley,	London.
Pasquale Villari,	Florence.

SECTION IV.—6.

Literature and the Fine Arts.

E. de Amicis,	Florence.
Gaston Boissier,	Paris.
Georg Brandes,	Copenhagen.
F. Brunetière,	Paris.
Jean Léon Gérôme,	Paris.
Rudyard Kipling,	Burwash.

STATUTES AND STANDING VOTES.

STATUTES.

Adopted May 30, 1854: *amended September* 8, 1857, *November* 12, 1862, *May* 24, 1864, *November* 9, 1870, *May* 27, 1873, *January* 26, 1876, *June* 16, 1886, *October* 8, 1890, *January* 11 *and May* 10, 1893, *May* 9 *and October* 10, 1894, *March* 13, *April* 10 *and May* 8, 1895, *May* 8, 1901, *January* 8, 1902, *and May* 10, 1905.

CHAPTER I.

Of Fellows and Foreign Honorary Members.

1. The Academy consists of Resident Fellows, Associate Fellows and Foreign Honorary Members. They are arranged in three Classes, according to the Arts and Sciences in which they are severally proficient, viz.: Class I. The Mathematical and Physical Sciences; — Class II. The Natural and Physiological Sciences; — Class III. The Moral and Political Sciences. Each Class is divided into four Sections, viz.: Class I., Section 1. Mathematics and Astronomy; — Section 2. Physics; — Section 3. Chemistry; — Section 4. Technology and Engineering. Class II., Section 1. Geology, Mineralogy, and Physics of the Globe; — Section 2. Botany; — Section 3. Zoölogy and Physiology; — Section 4. Medicine and Surgery. Class III., Section 1. Philosophy and Jurisprudence: — Section 2. Philology and Archæology; — Section 3. Political Economy and History; — Section 4. Literature and the Fine Arts.

2. The number of Resident Fellows shall not exceed two hundred. Only residents in the Commonwealth of Massachusetts shall be eligible to election as Resident Fellows, but resident fellowship may be retained after removal from the Commonwealth. Each Resident Fellow shall pay an admission fee of ten dollars and such annual assessment, not exceeding ten dollars, as shall be voted by the Academy at each annual

meeting. Resident Fellows only may vote at the meetings of the Academy.

3. The number of Associate Fellows shall not exceed one hundred, of whom there shall not be more than forty in either of the three classes of the Academy. Associate Fellows shall be chosen from persons residing outside of the Commonwealth of Massachusetts. They shall not be liable to the payment of any fees or annual dues, but on removing within the Commonwealth they may be transferred by the Council to resident fellowship as vacancies there occur.

4. The number of Foreign Honorary Members shall not exceed seventy-five; and they shall be chosen from among persons most eminent in foreign countries for their discoveries and attainments in either of the three departments of knowledge above enumerated. There shall not be more than thirty Foreign Members in either of these departments.

CHAPTER II.

Of Officers.

1. There shall be a President, three Vice-Presidents, one for each Class, a Corresponding Secretary, a Recording Secretary, a Treasurer, and a Librarian, which officers shall be annually elected, by ballot, at the Annual Meeting, on the second Wednesday in May.

2. At the Annual Meeting of 1901, nine Councillors shall be elected by ballot, one from each Class of the Academy to serve for one year, one from each Class for two years, and one from each Class for three years; and at annual meetings thereafter three Councillors shall be elected in the same manner, one from each Class, to serve for three years; but the same Fellow shall not be eligible for two successive terms. The nine Councillors, with the President, the three Vice-Presidents, the two Secretaries, the Treasurer, and the Librarian, shall constitute the Council. Five members shall constitute a quorum. It shall be the duty of this Council to exercise a discreet supervision over all nominations and elections. With the consent of the Fellow interested, they shall have power to make transfers between the several Sections of the same Class, reporting their action to the Academy.

3. If any office shall become vacant during the year, the vacancy shall be filled by a new election, and at the next stated meeting, or at a meeting called for this purpose.

CHAPTER III.

Of Nominations of Officers.

1. At the stated meeting in March, the President shall appoint from the next retiring Councillors a Nominating Committee of three Fellows, one for each class.

2. It shall be the duty of this Nominating Committee to prepare a list of candidates for the offices of President, Vice-Presidents, Corresponding Secretary, Recording Secretary, Treasurer, Librarian, Councillors, and the Standing Committees which are chosen by ballot; and to cause this list to be sent by mail to all the Resident Fellows of the Academy not later than four weeks before the Annual Meeting.

3. Independent nominations for any office, signed by at least five Resident Fellows and received by the Recording Secretary not less than ten days before the Annual Meeting, shall be inserted in the call for the Annual Meeting, which shall then be issued not later than one week before that meeting.

4. The Recording Secretary shall prepare for use, in voting at the Annual Meeting, a ballot containing the names of all persons nominated for office under the conditions given above.

5. When an office is to be filled at any other time than at the Annual Meeting, the President shall appoint a Nominating Committee in accordance with the provisions of Section 1, which shall announce its nomination in the manner prescribed in Section 2 at least two weeks before the time of election. Independent nominations, signed by at least five Resident Fellows and received by the Recording Secretary not later than one week before the meeting for election, shall be inserted in the call for that meeting.

CHAPTER IV.

Of the President.

1. It shall be the duty of the President, and, in his absence, of the senior Vice-President present, or next officer in order as above enumerated, to preside at the meetings of the Academy; to summon extraordinary meetings, upon any urgent occasion; and to execute or see to the execution of the Statutes of the Academy. Length of continuous membership in the Academy shall determine the seniority of the Vice-Presidents.

2. The President, or, in his absence, the next officer as above enumerated, is empowered to draw upon the Treasurer for such sums of money as the Academy shall direct. Bills presented on account of the Library, or the Publications of the Academy, must be previously approved by the respective committees on these departments.

3. The President, or, in his absence, the next officer as above enumerated, shall nominate members to serve on the different committees of the Academy which are not chosen by ballot.

4. Any deed or writing to which the common seal is to be affixed shall be signed and sealed by the President, when thereto authorized by the Academy.

CHAPTER V.

Of Standing Committees.

1. At the Annual Meeting there shall be chosen the following Standing Committees, to serve for the year ensuing, viz.: —

2. The Committee of Finance, to consist of the President, Treasurer, and one Fellow chosen by ballot, who shall have full control and management of the funds and trusts of the Academy, with the power of investing or changing the investment of the same at their discretion. The general appropriations for the expenditures of the Academy shall be moved by this Committee at the Annual Meeting, and all special appropriations from the general and publication funds shall be referred to or proposed by this Committee.

3. The Rumford Committee, of seven Fellows, to be chosen by ballot, who shall consider and report on all applications and claims for the Rumford Premium, also on all appropriations from the income of the Rumford Fund, and generally see to the due and proper execution of this trust.

4. The C. M. Warren Committee, of seven Fellows, to be chosen by ballot, who shall consider and report on all applications for appropriations from the income of the C. M. Warren Fund, and generally see to the due and proper execution of this trust.

5. The Committee of Publication, of three Fellows, one from each Class, to whom all communications submitted to the Academy for publication shall be referred, and to whom the printing of the Memoirs and the Proceedings shall be intrusted.

6. The Committee on the Library, of the Librarian ex officio and three other Fellows, one from each class, who shall examine the Library, and make an annual report on its condition and management.

7. An Auditing Committee of two Fellows, for auditing the accounts of the Treasurer.

CHAPTER VI.

Of the Secretaries.

1. The Corresponding Secretary shall conduct the correspondence of the Academy, recording or making an entry of all letters written in its name, and preserving on file all letters which are received; and at each meeting he shall present the letters which have been addressed to the Academy since the last meeting. Under the direction of the Council for Nomination, he shall keep a list of the Resident Fellows, Associate Fellows, and Foreign Honorary Members, arranged in their Classes and in Sections in respect to the special sciences in which they are severally proficient; and he shall act as secretary to the Council.

2. The Recording Secretary shall have charge of the Charter and Statute-book, journals, and all literary papers belonging to the Academy. He shall record the proceedings of the Academy at its meetings; and after each meeting is duly opened, he shall read the record of the preceding meeting. He shall notify the meetings of the Academy, apprise officers and committees of their election or appointment, and inform the Treasurer of appropriations of money voted by the Academy. He shall post up in the Hall a list of the persons nominated for election into the Academy; and when any individual is chosen, he shall insert in the record the names of the Fellows by whom he was nominated.

3. The two Secretaries, with the Chairman of the Committee of Publication, shall have authority to publish such of the records of the meetings of the Academy as may seem to them calculated to promote its interests.

CHAPTER VII.

Of the Treasurer.

1. The Treasurer shall give such security for the trust reposed in him as the Academy shall require.

2. He shall receive officially all moneys due or payable, and all bequests or donations made to the Academy, and shall pay such sums as the Academy may direct. He shall keep an account of all receipts and expenditures; shall submit his accounts to the Auditing Committee; and shall report the same at the expiration of his term of office.

3. The Treasurer shall keep separate accounts of the income and appropriation of the Rumford Fund and of other special funds, and report the same annually.

4. All moneys which there shall not be present occasion to expend shall be invested by the Treasurer, under the direction of the Finance Committee.

5. The Treasurer may appoint an Assistant Treasurer to perform his duties, for whose acts as such Assistant, the Treasurer shall be responsible; or the Treasurer may employ any Trust Company, doing business in Boston, Massachusetts, as agent to perform his duties; the compensation of such Assistant Treasurer or agent to be paid from the funds of the Academy.

CHAPTER VIII.

Of the Librarian and Library.

1. It shall be the duty of the Librarian to take charge of the books, to keep a correct catalogue of them, to provide for the delivery of books from the Library, and to appoint such agents for these purposes as he may think necessary. He shall make an annual report on the condition of the Library.

2. The Librarian, in conjunction with the Committee on the Library, shall have authority to expend such sums as may be appropriated, either from the General, Rumford or other special Funds of the Academy, for the purchase of books, and for defraying other necessary expenses connected with the Library.

3. To all books in the Library procured from the income of the Rumford Fund, or other special funds, the Librarian shall cause a stamp or label to be affixed, expressing the fact that they were so procured.

4. Every person who takes a book from the Library shall give a receipt for the same to the Librarian or his assistant.

5. Every book shall be returned in good order, regard being had to the necessary wear of the book with good usage. If any book shall be lost or injured, the person to whom it stands charged shall replace it by a new volume or set, if it belongs to a set, or pay the current price of the volume or set to the Librarian; and thereupon the remainder of the set, if the volume belonged to a set, shall be delivered to the person so paying for the same.

6. All books shall be returned to the Library for examination at least one week before the Annual Meeting.

7. The Librarian shall have custody of the Publications of the Academy and shall distribute copies among the Associate Fellows and Foreign Honorary Members, at their request. With the advice and consent of the President, he may effect exchanges with other associations.

CHAPTER IX.

Of Meetings.

1. There shall be annually four stated meetings of the Academy; namely, on the second Wednesday in May (the Annual Meeting), on the second Wednesday in October, on the second Wednesday in January, and on the second Wednesday in March. At these meetings only, or at meetings adjourned from these and regularly notified, shall appropriations of money be made, or alterations of the statutes or standing votes of the Academy be effected.

2. Fifteen Fellows shall constitute a quorum for the transaction of business at a stated meeting. Seven Fellows shall be sufficient to constitute a meeting for scientific communications and discussions.

3. The Recording Secretary shall notify the meetings of the Academy to each Fellow residing in Boston and the vicinity; and he may cause the meetings to be advertised, whenever he deems such further notice to be needful.

CHAPTER X.

Of the Election of Fellows and Honorary Members.

1. Elections shall be made by ballot, and only at stated meetings.

2. Candidates for election as Resident Fellows must be proposed by two Resident Fellows of the section to which the proposal is made, in a recommendation signed by them, and this recommendation shall be transmitted to the Corresponding Secretary, and by him referred to the Council for nomination. No person recommended shall be reported by the Council as a candidate for election, unless he shall have received a written approval, signed at a meeting of the Council by at least five

of its members. All nominations thus approved shall be read to the Academy at a stated meeting, and shall then stand on the nomination list during the interval between two stated meetings, and until the balloting. No person shall be elected a Resident Fellow, unless he shall have been resident in this Commonwealth one year next preceding his election. If any person elected a Resident Fellow shall neglect for one year to pay his admission fee, his election shall be void; and if any Resident Fellow shall neglect to pay his annual assessments for two years, provided that his attention shall have been called to this article, he shall be deemed to have abandoned his Fellowship; but it shall be in the power of the Treasurer, with the consent of the Council, to dispense (*sub silentio*) with the payment both of the admission fee and of the assessments, whenever in any special instance he shall think it advisable so to do.

3. The nomination of Associate Fellows may take place in the manner prescribed in reference to Resident Fellows. The Council may in like manner originate nominations of Associate Fellows, which must be read at a stated meeting previous to the election, and be exposed on the nomination list during the interval.

4. Foreign Honorary Members shall be chosen only after a nomination made at a meeting of the Council, signed at the time by at least seven of its members, and read at a stated meeting previous to that on which the balloting takes place.

5. Three fourths of the ballots cast must be affirmative, and the number of affirmative ballots must amount to eleven to effect an election of Fellows or Foreign Honorary Members.

6. A majority of any section of the Academy is empowered to present lists of persons deemed best qualified to fill vacancies occurring in the number of Foreign Honorary Members or Associate Fellows allotted to it; and such lists, after being read at a stated meeting, shall be referred to the Council for Nomination.

7. If, in the opinion of a majority of the entire Council, any Fellow — Resident or Associate — shall have rendered himself unworthy of a place in the Academy, the Council shall recommend to the Academy the termination of his Fellowship; and provided that a majority of two thirds of the Fellows at a stated meeting, consisting of not less than fifty Fellows, shall adopt this recommendation, his name shall be stricken off the roll of Fellows.

CHAPTER XI.

Of Amendments of the Statutes.

1. All proposed alterations of the Statutes or additions to them, shall be referred to a committee, and, on their report at a subsequent meeting, shall require for enactment a majority of two thirds of the members present, and at least eighteen affirmative votes.

2. Standing votes may be passed, amended, or rescinded, at any stated meeting, by a majority of two thirds of the members present. They may be suspended by a unanimous vote.

CHAPTER XII.

Of Literary Performances.

1. The Academy will not express its judgment on literary or scientific memoirs or performances submitted to it, or included in its publications.

STANDING VOTES.

1. Communications of which notice had been given to the Secretary shall take precedence of those not so notified.

2. Resident Fellows who have paid all fees and dues chargeable to them are entitled to receive one copy of each volume or article printed by the Academy, on application to the Librarian personally or by written order, within two years from the date of publication. And the current issues of the Proceedings shall be supplied, when ready for publication, free of charge, to all the Fellows and members of the Academy who desire to receive them.

3. The Committee of Publication shall fix from time to time the price at which the publications of the Academy may be sold. But members may be supplied at half this price with volumes which they are not entitled to receive free, and which are needed to complete their sets.

4. Two hundred extra copies of each paper accepted for publication in the Memoirs or Proceedings of the Academy shall be placed at the disposal of the author, free of charge.

5. Resident Fellows may borrow and have out from the Library six volumes at any one time, and may retain the same for three months, and no longer.

6. Upon special application, and for adequate reasons assigned, the Librarian may permit a larger number of volumes, not exceeding twelve, to be drawn from the Library for a limited period.

7. Works published in numbers, when unbound, shall not be taken from the Hall of the Academy, except by special leave of the Librarian.

8. Books, publications, or apparatus shall be procured from the income of the Rumford Fund only on the certificate of the Rumford Committee that they, in their opinion, will best facilitate and encourage the making of discoveries and improvements which may merit the Rumford Premium.

9. A meeting for receiving and discussing scientific communications may be held on the second Wednesday of each month not appointed for stated meetings, excepting July, August, and September.

RUMFORD PREMIUM.

In conformity with the terms of the gift of Benjamin, Count Rumford, granting a certain fund to the American Academy of Arts and Sciences, and with a decree of the Supreme Judicial Court for carrying into effect the general charitable intent and purpose of Count Rumford, as expressed in his letter of gift, the Academy is empowered to make from the income of said fund, as it now exists, at any Annual Meeting, an award of a gold and a silver medal, being together of the intrinsic value of three hundred dollars, as a premium to the author of any important discovery or useful improvement in light or in heat, which shall have been made and published by printing, or in any way made known to the public, in any part of the continent of America, or any of the American islands; preference being always given to such discoveries as shall, in the opinion of the Academy, tend most to promote the good of mankind; and to add to such medals, as a further premium for such discovery and improvement, if the Academy see fit so to do, a sum of money not exceeding three hundred dollars.

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